IODINE DEFICIENCY DISORDERS
CHINA

CURRENT STATUS, CONTROL MEASURES AND FUTURE STRATEGY

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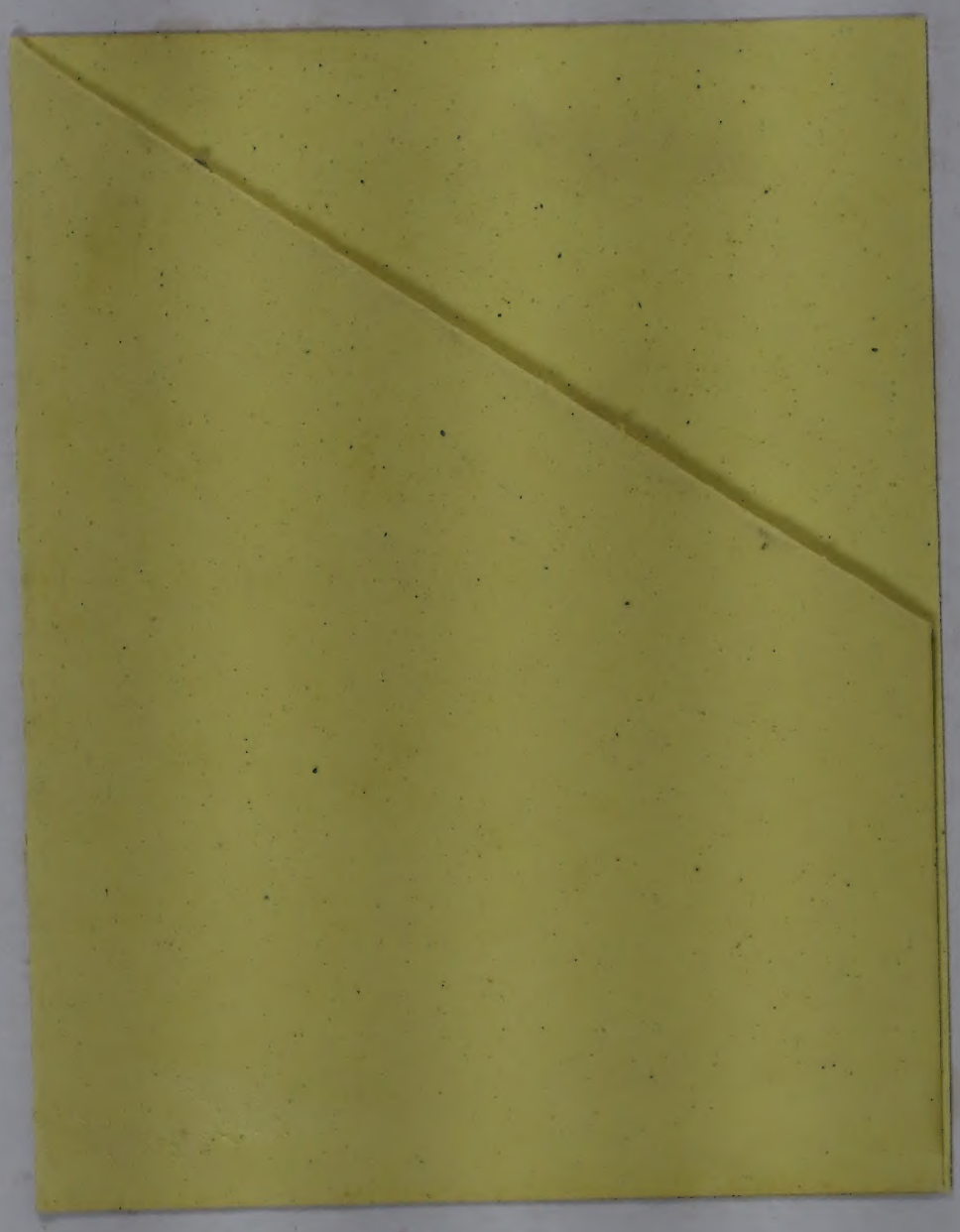

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EXECUTIVE SUMMARY — PAGE NO

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1. An estimated 300 million persons in Peoples Republic of China (PRC) live in known iodine deficient areas. Of these 34 million are goitrous and the estimated number of cretins in China are 200,000. For every cretin detected there are several more "cretinoids".

2. Though 'Goitre' was among the endemic diseases ear-marked for eradication early in the fifties, effective action to control iodine deficiency disorders was taken only in 1978 when the scourge of endemic cretinism, as observed in the Jixian Village of the Huchun County of Heilongjiang Province, was brought to the notice of the political leadership.

3. Within seven years of the 'Jixian Episode', 90% of the known iodine deficient regions of the PRC have been covered by effective salt iodation programmes. However, due to problems of logistics some areas of the country with serious IDD, namely Inner Mongolia, Xinjiang Autonomous Region and Tibet Autonomous Region, still remain to be brought under iodine prophylaxis.

4. The impressive accomplishments of PRC in the control of iodine deficiency are largely the result of a forceful and pragmatic action programme devised and implemented by the Central Leading Group (CLG) on endemic diseases in China, as well as the tight governmental control on salt movement and trade in the country. However with the emerging liberal policies and privatisation of trade in PRC, one can clearly foresee risk of breakdowns in the ongoing salt iodation programme.

5. The Government of PRC, however, are fully aware of and alive to their responsibility of ensuring healthy development of the limited number of children allowed to be born in China under its stringent one-child policy. Hence it is going ahead with plans to organise a country-wide IDD detection and control programme with an important component of monitoring and evaluation to ensure continued success of the programme.

6. To achieve the above goal, it is proposed to develop three centres of excellence for the study and surveillance of IDD in PRC. The functions of these centres are envisaged to be:

6.1 To meet the training needs to develop personnel of the required expertise for the programme.

6.2 To adopt and adapt new technology in the study and surveillance of IDD and its prophylaxis.

6.3 To serve as national reference centres for quality control of various laboratories; methodologies in use in IDD programmes, and

6.4 To serve as an important international link of ongoing IDD programmes in China and elsewhere in the world.

7. Considering the laudable objectives, and also the modest inputs requested by the PRC for the important 'initial' step towards a country-wide, comprehensive and modern system of IDD surveillance and control, UNICEF support for such an activity will be entirely in tune with its policy of supporting "catalytic programmes" that would lead to better child health and development.

I. INTRODUCTION

1. Iodine Deficiency Disorders in Asia

Of the estimated 435 million people living in iodine deficient regions in Asia, 300 million belong to the People's Republic of China. The status of Iodine Deficiency Disorders and its prevention in China, remained largely unknown to the outside world till recently. However, in 1982, a group of scientists working on IDD in China, under the leadership of Prof Chu Hsien-I, M.D., Director of Endocrinology Institute, Tianjin Medical College, Tianjin, participated and presented information on IDD in China at the Second Asia and Oceania Thyroid Association Meeting held at Tokyo. From then on, Chinese scientists have been participating in several scientific meetings and providing more and more information on the problem of IDD in China.

Among the noteworthy features of the facts presented on IDD are the remarkable success achieved by CHina in the control of IDD and the development, by Chinese scientists, technical knowhow to prepare Iodised Oil for parenteral and oral use. During the course of discussions in several international meetings, Chinese scientists have been evincing keen interest in the application of modern techniques of monitoring and evaluation of IDD prophylactic programmes in China. The most important among these has been the application of the technique for Neonatal Hypothyroidism (NH) screening, as a measure of monitoring and evaluation. The present visit to China was mainly arranged for the purpose of exploring the feasibility of organizing modern systems of monitoring and evaluation of IDD and its prophylaxis, as well as for reporting on the Chinese proposal submitted to the UNICEF for the above purpose. In addition, comprehensive evaluation of IDD as a public health problem in China, including its epidemiological features, were

envisaged as an objective of the present visit. The present report is based on direct observations as well as discussions we have had with Chinese scientists during the course of the visit by us between the 28th of June and 20th of July 1985. Besides, it also incorporates recommendations regarding the future development of IDD programme in China.

2. Iodine Deficiency Disorders: Some Recent Perceptions of Particular Relevance to China

> "If a nomenclature is not correct, the speculation will not be logical, if a speculation is not logical, then work cannot be successful"
>
> – Confucius

Recent reports on the high incidence of neonatal hypothyroidism in iodine deficient regions of India, Zaire and Italy, have helped to refocus attention from "goitre" to 'brain development' in iodine deficient regions. Deliberations of a recent International Symposium on "Iodine Nutrition, Thyroxine and Brain Development" have drawn attention to the fact that impaired brain development is the most important health effect of iodine deficiency. Based on this awareness it recommended urgent and effective prophylactic measures in all endemias of iodine deficiency. This recommendation is of immediate relevance to China in view of its evidently successful efforts to control population by adopting a policy of one child per family. Since enforcing restriction of family size, as a matter of state policy, brings with it the moral responsibility to adopt all measures to ensure the healthy growth and development of the children born, the Government of the Poeple's Republic of China (PRC) has shown dynamism and commitment in urgent eradication of IDD. As part of this, the PRC Government plans to organize a countrywide system of monitoring and

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evaluation of IDD and it prophylaxis to ensure continued success of the IDD prevention programme and thus prevent mental retardation. Screening for NH is envisaged as an important component of this effort, for the following reasons:

(i) It is the most sensitive, direct and dynamic parameter to indicate availability of iodine to the most suceptible subject, namely the newborn.

(ii) It permits effective intervention at a sufficiently early time to prevent mental retardation in the affected child by initiating thyroxine treatment.

(iii) It gives the earliest indication of dislocation of ongoing iodine prophylaxis in the community in the form of increased incidence of NH.

(iv) The NH screening programmes, initiated in iodine deficient regions, can be successfully extended to the whole country, as a measure to prevent mental retardation due to NH, as is being practised in Western countries.

Because of the above considerations, it has been our effort during the course of our visit to China to assess the problem of IDD in China from the point of view of brain development and also to explore the feasibility of introducing NH screening as an important measure for monitoring and evaluation of IDD and its prophylaxis. In the following sections, we shall be detailing our experience and impressions in this regard and suggest ways and means to modernize and update IDD programme in China.

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II. IODINE DEFICIENCY DISORDERS IN CHINA: AN OVERVIEW

"True knowledge comes from practice"

-Mao Zedong

1. Iodine Deficiency Disorders in China

According to the projections made by the Central Leading Group (CLG) on Endemic Diseases in China, based on preliminary reports from different parts of the country, over 300 million people live in areas of known iodine deficiency in the People's Republic of China (PRC). Of these an estimated 34 million are goitrous. Number of overt cretins in China is believed to be over 200,000. There are a total of 30 Provinces, Autonomous Regions and Municipalities in China. Sporadic reports on prevalence of endemic goitre are available from all the regions except Shanghai Municipality. Prevalence of cretinism has been reported from all the administrative regions other than Shanghai, Jiangsu and Jiangxi.

According to Dr Yu Hain Yuan, Director of Leading Group of Endemic Diseases in Heilongjiang Province, 11 of the 16 Provinces of Northern China (North of Yangtze River) have been systematically surveyed for IDD prevalence and iodine prophylaxis initiated in counties found to have significant IDD. In the remaining five provinces, evaluation is in progress and salt iodation planned.

Most of the Southern Provinces are still under evaluation and an overall picture in the Southern Provinces is still to emerge. This lacuna is particularly striking with regard to the Tibet Autonomous Region, where due to geographical reasons IDD is likely to be severe and therefore prophylactic measures may be urgently needed.

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2. Iodine Deficiency Disorders in some Provinces of China

In this section information on IDD prevalence gathered during our visit, from scientists and officials working on IDD in different parts of the country, is presented. Table I provides information on prevalence of goitre and cretinism in some of the Provinces, Autonomous Regions and Municipalities of the country. The information is given by the Central Leading Group on Endemic Diseases. Altogether, the information in Table I refers to 502 countries belonging to 10 different regions. It covers a population of over 101 million. The total number of goitrous people discovered from these regions is roughly 29 million, indicating an overall goitre prevalence of 29% [Goitre of Grade I and above, Chinese Classification fro Grading Goitre: Appendix I], [International Classification for Grading Goitre: Appendix II]. The number of cretins discovered in these regions total roughly to 41,670 giving an overall prevalence of cretinism of 0.4 per 1000. [Chinese Definition of Endemic Cretinism: Appendix III].

It is noteworthy in this context that in more than one area belonging to the above iodine deficient regions, scientists working on IDD from the Tianjin Medical College have organized systematic studies to evaluate higher mental functions of the local populations. Thus, according to the information presented by Dr Ma Tai, Vice-Chairman of the Scientific Advisory Committee of the Central Leading Group on Endemic Diseases, in the endemic regions of China, for every frank cretin observed, several more defective individuals would be detected. Dr Ma Tai tend to characterize these individuals as 'cretinoids'.

Though the cretinoids do not fulfill the definition of Endemic Cretinism as is internationally accepted, [Appendix IV] higher prevalence of such defective individuals in iodine deficient goitrous regions bring out an epidemiological relationship between the occurence of such individuals and the prevalence of iodine deficiency and goitre.

Impaired mental development occurring in significant proportion of people living in iodine deficient regions is also clearly reflected in the recent findings of the IDD Group of the Tianjin Medical College presented to us during our visit. Studies done on Intelligence Quotient (IQ) distribution of children belonging to age group 7 to 8 years in the Heqn county of Shanxi Province showed significant shift of IQ scores of children belonging to villages with iodine deficiency, when compared with those children belonging to the village without iodine deficiency. Similar results were also observed on studying certain developmental quotient of babies belonging to age group 0 to 5 years in the same county. Results of similar nature indicating retarded mental development of children were also observed in Lamasi village of Chengde county of Hebei Province (for details please refer to Appendix V & VI). These observations clearly indicate that considerable brain damage has been occurring in population living in iodine deficient regions of China and that from the point of view of child development, Iodine deficiency Disorders are of considerable importance in China.

3. IODINE DEFICIENCY DISORDERS IN HEILONGJIANG AND JIANGSU PROVINCES AND TIBET AUTONOMOUS REGION

During the course of the present consultancy, we had the opportunity to visit two Provinces of China and evaluate the IDD status. Besides we made conscious effort to gather as much information as possible on the Tibet Autonomous Region during our

visit to Jiamusi Medical College. One of the Provinces which we visited was Heilongjiang Province belonging to North-eastern region of China and the other was Jiangsu Province belonging to South-eastern region of China. In the present set up, the study of IDD problem in the Heilongjiang Province and Tibet Autonomous Region comes under the perview of Jiamusi Medical College, Jiamusi and that of Jiangsu Province come under Tianjin Medical College, Tianjin. During the Course of our consultancy, besides visiting some endemic regions of two Provinces we have also had opportunities to visit the two medical college and hold discussions with scientists of the IDD group of the respective colleges.

3.1 IODINE DEFICIENCY DISORDERS IN HEILONGJIANG PROVINCE

After the liberation of People's Republic of China in 1949, the Government took eradication of major endemic diseases as a priority programme and included it in all the Five Year Plans. Considering the agricultural nature of Chinese economy, importance was then primarily given to tackling endemic diseases like plague, small pox, kala-azar, relapsing fever and typhus which seriously affected the health and the productivity of the Chinese peasant.

Though endemic goitre was also among the endemic diseases recognized at that time, and the Central Government of PRC directed the Local Government of Heilongjiang Province to initiate iodised salt prophylaxis, due to the then prevailing perceptions that endemic goitre is not a very "serious" health problem, the programme was not given the necessary attention.

By 1976 most of the major endemic diseases were already under control in China. A new interest began emerging on those diseases that were yet to be controlled. This happened particularly after the so called "Cultural Revolution".

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in 1978, during the course of governmental investigations on drought in the Province, it was noticed that in the Jixian village of Huachun county, there were a large number of 'foolish' people. Based on this report, the Government sent Dr Yu Hai Yuan, Director of Leading Group on Endemic Diseases to visit the village and submit a report. Dr Yu Hai Yuan was also accompanied by a representative of Food and Water Supply Ministry. After investigations Dr Yu reported the presence of endemic goitre and endemic cretinism in the village of General Li Desheng, Chairman of the Central Leading Group on Endemic Diseases and Member of the Politburo, People's Republic of China. General LI Desheng visited the village later in the year and realised the enormity of the human tragedy caused by iodine deficiency in the village.

Declaring "we are communists and have concern for the people; we are not Kuomintang", he ordered immediate and dynamic action to control endemic goitre and endemic cretinism in the province by the year 1985.

This order was promptly accepted by the Provincial Government and a meeting of 500 officials belonging to the Health, Commerce and Salt Industry Departments of the Province was organized at Jiamusi in 1978. All the 500 officials were made to visit Jixian village to get first hand experience of the tragedy of endemic goitre and cretinism in the village. This experience of the officials involved with the programme of IDD control, imparted great momentum to the programme. In a matter of six months, the whole of Heilongjiang Province was surveyed to size up its IDD problem. It was found that Iodine Deficiency Disorders are widely prevalent all over the Province. IDD was reported from a total of 79 towns and counties. As per estimates made in 1978, of the 32 million people in the Province 21 million were living in areas of Iodine Deficiency. It was observed that, 17.7 million had visible goitre (Goitre of Grade I and above, Chinese Classification: Appendix-I). There were a total

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of 3500 cretins living in 88 villages. Several fold more cretinoids were also discovered. The picture of IDD in the province thus emerged was one of great magnitude and seriousness, presumably caused by recurrent and extensive flooding of the four major rivers and their extensive flooding of the four major rivers and their extensive net-work of tributaries distributed throughout the province. By the end of 1979, an action group of over 300 officials from different relevant departments in the Province was organized and entrusted with the responsibility of IDD control by the year 1985. All the 400 warehouses for food storage were supplied with salt iodation plants. Due to the habit of consuming vegetables pickled in concentrated salt solution, during most of the year in the province, the per capita salt consumption was higher in this northern province and averaged 9.5 kg per year. Based on this estimate, the level of iodation of salt was kept at 1 in 50,000 (i.e. 20 parts per million) to ensure availability of adequate iodine at the consumer level.

By adopting energetic methods of salt iodation throughout the Province an estimated 13 million goitrous patients were cured by 1982. The rest 4 million remained goitrous presumably because of the large glands with nodular distortions at the time of initiation of iodine prophylaxis. Most satisfying, however, was the observation that by the year 1982, endemic goitre as a health problem was no more evident among the school children of the Province.

3.1.1 THE STORY OF IDD IN JIXIAN VILLAGE

The story of Jixian village of Huachun county is of particular relevance not only to the IDD problem of Heilongjiang Province but it has a direct bearing on the story of IDD control in the whole of PRC after the so called "Cultural Revolution". For, it

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is the visit of General Li Desheng, Chairman of the Central Leading Group on Endemic Diseases and Member of the Politburo, People's Republic of China, to this village that led ultimately to the widespread realization that iodine deficiency is not a mere "cosmetic" health problem causing goitre but a major disaster that cripples human potential - mental as well as physical.

In point of fact, the declaration of General Li Desheng, that iodine deficiency should be eradicated by 1985 can be named the "Jixian Declaration". The transformation that has occured in this village between 1978, when "Jixian Declaration" was made an when we visited it, in 1985, dramatically exemplify what iodine prophylaxis can accomplish to transform a decaying community to one of accomplishments and self-confidence. The facts that we gathered during our visit to the village, speak for themselves.

The total estimated population of Jixian village in 1978 was 1300, the population remains more or less the same in 1985. In the 1113 population surveyed, 859 people had goitre, giving a total prevalence of 77%. A total of 145 overt cretins could be detected in the 1113 population surveyed giving an overall prevalence of 11%. The cretins were predominantly neurological (143 out of 145) presenting with a classical syndrome of mental retardation, deaf-mutism and spastic gait. These defects were occurring in varying combinations. The villagers used to drink water from shallow well which had iodine content of 1.09 microgrammes per litre. The results of studies on thyroxine (T_4) level of the village population revealed T_4 levels belonging to the lower limit of the normal.

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The thyroid enlargement among the school children was 74.5%. Though all the children belonging to school going age attended the village primary school in 1978, there was, on an average, 20% dropout at each class level till the final class, i.e. 6th class of primary school. Thus, only a small proportion of children reached to the final level of a primary school.

In 1978, the villages of scholars (Jixian village means village of scholars or intelligent people) had no trained professionals among its population, no teachers nor army recruits. The gross annual agricultural produce of the village was worth 19000 Yuans. There were no skilled personnel among the villagers and there were no factories. The economic productivity was among the lowest and living standards poor. Because of the high prevalence of defectives in the village, it was rare for outside villagers to marry into Jixian community. The village community was trapped into a vicious cycle of iodine deficiency, leading to compromised mental and physical development of its population thus perpetuating the socio-economic backwardness of its inhabitants.

Following the "Jixian Declaration" of 1978, the Central Leading Group on Endemic Diseases, under the Chairmanship of General Li Desheng organized the most comprehensive programme of IDD control in the Jixian village encompassing all the five levels of prevention, namely health promotion, specific protection, early diagnosis and treatment, disability limitation and rehabilitation. The measures adopted by the county for the successful control of iodine deficiency disorders are:

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(1) Iodised salt supply was started from 1978, salt iodation was done at the concentration of 20 parts per million (i.e. in 50,000) and it was implemented forthwith by installing salt iodation station at the Food Storage Warehouse of the Hua Chaun county thus ensuring iodation of the entire edible salt distributed to the county.

(2) A deep well was dug in 1979 to the depth of 97 metres as against the previous depth of 8 meteres. This well supplies piped water to the entire village. The iodine content of deep well water is 20 microgrammes per litre as against less than 2 microgrammes per litre estimated in the shallow well water. The iodine content of water samples were estimated in Jiamusi Medical College by the members of Prof Li Jian Qun's team and also confirmed at Tianjin Medical College by Prof Ma Tai's team.

(3) All the women belonging to the reproductive age group as well as school children were covered by iodised oil injection programme in the village. One ml of iodised oil was the dose administered.

(4) Some goitrous patients also received Potassium iodate tablets.

(5) All those with huge goitres and willing to undergo surgical treatment, were provided with the services by bringing in surgeons from Hua Chaun town, who operated on goitrous patients in operation theatre set up at the village hospital.

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(6) A special school was organized for cretins to salvage such higher neurological functions as are salvagable and make them useful members of the community. Only cretins below the age of 15 years are trained. The severe ones and the old cretins do not receive any training. In one class for cretins not more than 10 to 15 cretins can be trained. In Jixian village cretin school, 32 cretins are being trained. After training there was significant improvement in several neurological functions such as walking, reading and work ability. Some re-educated cretins have gone to primary school makes noodles in the noodle-making machine for the whole village.

There are few families in the village where more than one member was a cretin or a deaf-mute. In one such family, we saw the dramatic example of a deaf-mute girl painting surprisingly good landscapes and drawing fairly well done portraits, after two to three years training in the cretin school. During our visit to cretin school, we have seen several children, who fit in with the definition of endemic cretinism, being able to write their name and do simple arithmetic calculations. In our experience, China is the only country which has taken pains to organize efforts to rehabilitate endemic cretins. As a measure of comprehensive prevention, this approach is entirely laudatory and is a glowing example of the great concern of the Government of PRC for its people.

The results of this remarkable and all out effort to control IDD in the village was dramatically evident. Thus, in 1985, there are only 61 goitrous people in the whole village, all of whom are old and have nodular goitre. During our visit to the village, we could not find a single goitrous child of the younger age group (1 to 7 years) in the entire village. There were no cretins below 7 years of age in the village.

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However, the most telling impact of the success of iodine prophylaxis was evident in certain parameters of socio-economic status of the village. Thus, the per capita income of the village which was a mere 43 Yuans at the time of salt iodation in 1978 rose to 508 Yuans in 1984, after six years of iodine prophylaxis. The gross agricultural produce of the village was an estimated 19000 Yuans in 1978 rose to 88,000 Yuan in 1984. Though, as required by law, all children of school going age attended school, both in 1978 and 1984, before 1979, there was an average 20% dropout at each class level till the 6th class. Whereas in 1984, 100% of the enrolled school children went through the six primary classes without failure. To reinforce this improved academic performance of children, in 1978, the ranking of the Primary School children of this village was the lowest, i.e. 16th in the county whereas in 1984, this ranking rose to number three.

The general improvement in the work efficiency and improved skill of the labour force of the village after iodation is also evident in the recent beginning of industrial activities, for the first time, in the village. Thus, from 1982, two factories, one producing bricks and another producing decorating material, have been commissioned in the village and are functioning at satisfactory productivity. These seem to be also a favourable climate emerging, after iodation, that encourage people to become domicile of the village. Thus, before 1979, the tendency of the people was to migrate away from the village. Whereas with improved conditions after IDD control, not only are people willing to come and stay in the village but the marriages between the residents of the village and other villages are becoming increasingly common. Improved living conditions are also widely evident in the village in the form of increasing use of such items as radio, television, washing machine etc. Gradually brick houses are replacing the mud- houses!

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An important point worth mentioning in this context, is that economic transformation of Chinese villages has been occurring throughout the country after 1976, when the so called "Cultural Revolution" came to an end and economic policies became liberalized. However, the socio-economic transformation that has occurred in Jixian village after 1978 is qualitatively different and quantitatively much more impressive than what was evident elsewhere in the areas visited in the country. It is our impression that effective iodine prophylaxis has greatly contributed to the dramatic socio-economic transformation that has been brought about in the village during the period 1979 and 1985. A systematic scientific study of this phenomenon would be a great contribution towards establishing the long suspected nexus between iodine deficiency and socio-economic backwardness, in areas inhabitated by millions of people in the developing world. During our discussions, we have urged Chinese Scientist to undertake such studies and publish them in International Journals.

3.2 IODINE DEFICIENCY DISORDERS IN JIANGSU PROVINCE

Jiangsu Province belongs to the Eastern region of China. Nanjing City is the capital of this Province. The area of this province is 102,200 sq. km. and the total estimated population as per the 1982 census is 60.52 million.

The problem of Iodine Deficiency Disorders (IDD) has been receiving attention in this province since 1980. Between 1980 and 1982, epidemiological surveys for IDD were carried out in the whole province. Of the 75 counties of the province, IDD has been reported from 45 counties. Of these, in 10 counties, which are located in the Southern mountainous regions, severe IDD has been reported. An estimated 10 million people are living in known IDD regions of which

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3.4 million are goitrous (95% of the people have Grade I enlargement of the thyroid gland as per the Chinese classification of goitre grading). No typical cretins have been reported in the above endemias. However, in some endemic regions of the Province, mental sub-normality and poor school performance have been reported among primary school children.

During the course of our consultancy, we have had the opportunity to visit iodine deficient region of Yangzhong county of this province. Yangzhong county is located at a distance of 50 km from Zhenjiang, the ancient cultural city, in the central part of Jiangsu province. It is a group of three islands in the Yangtze river, formed over 800 years ago. The island is 40.5 metres above mean sea level and has an area oaf 228 sq. km. The total population of Yangzhong county is 260,000. The population of school children in the age group of 7 to 14 years is 50,000. There is 100% enrolment of the children of the age group 7 to 14 years. Majority of the people are engaged in agriculture activities and the population density is.100 persons per sq. km. Rice and wheat are the main crops. The main source of drinking water on the island is ponds., The ponds have an average depth of 2 to 3 metres. Approximately 40% of th people have access to tap water which is purified at the Central Water Purification Plan located at the county headquarters. The salt used for cooking is sea-salt which comes from Lianyungong port city. It is not iodised.

3.2.1 IODINE DEFICIENCY DISORDERS IN YANGZHONG COUNTY

The Central Leading Group on Endemic Diseases in collaboration with the Prevention Department of Jiangsu province conducted a preliminary epidemiological survey in 25 villages of the county in 1982. The 25 villages were selected in such a manner as to represent East, West, North and South and Central part of the island. Of the total of 29,675 population in the 25 villages selected, 17,313 (58%) were examined for IDD. In a randomised group

of 239 adults subjects from 25 villages urine samples were collected to determine iodine concentration. Also, at random, 25 water samples were collected from different source of potable water. The analysis of iodine content in urine and water and creatinine content in urine was done at the Biochemistry Laboratory of Zhenjiang Medical College. The results of urinary iodine were expressed as microgrammes of iodine per gm creatinine.

Of the 17,313 population examined, goitre was present in 37.29%. The details of the results of the goitre survey urinary iodine excretion and iodine content of water is given in Table - II. Of the total 239 urine sample collected for iodine estimation in the above population, 14% had urinary iodide excretion and iodine content of water is given in Table- II. Of the total 239 urine sample collected for iodine estimation in the above population, 14% had urinary iodide excretion (UEI) less than 25 ug per gm of creatinine and 45% had UEI between 25 and 50 ug of iodine per gm of creatinine. The remaining had showed UEI of more than 50 ug of iodine per gm of creatinine. This pattern of UEI excretion suggest significant IDD deficiency and 37% prevalence of Grade I or above goitre is quite consistent with observations of UEI pattern.

The picture of moderate iodine deficiency and goitre emerged by the community studies was faithfully reflected among the goitre prevalence studies done in the school children. Of the 40,000 school children in the age group 7 to 14 years, a total of 7345 school children were examined for enlargement of the thyroid gland. The results revealed an overall goitre prevalence of 37.5%. During this survey from several villages, the teachers reported poor school performance by the school children. These observations prompted the local and provincial government to pay more attention to the problem of IDD.

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One water sample from each of the 25 villages surveyed was collected and analysed for iodine content. The iodine content of water samples varied between 4.3 and 73.0 tg of iodine per litre. Four water samples had iodine content less than 5 ug of iodine per litre. The iodine content of water measures from different villages of county do not suggest significant environmental iodine deficiency. Nevertheless, goitre prevalence and pattern of UEI in the community clearly indicate moderate iodine deficiency. Endemic cretinism, however, was not observed in this county as elsewhere in the province. The discrepancy between UEI and goitre prevalence on one hand and more than 25 ug of iodine content of water on the other, remain unexplained.

3.3 IODINE DEFICIENCY DISORDERS (IDD) IN XIZANG ZIZHIQU (TIBET AUTONOMOUS REGION)

Tibet Autonomous Region has an estimated population of 3 million. In 1950, doctors of Red Army reported on goitre prevalence in Tibet. Since information was not adequate, no action was taken to control the problem.

Central Leading Group on Endemic Diseases was established in Tibet in 1978. Jiamusi Medical College of Heilongjiang Province belonging to North-East China was given the responsibility of studying Iodine Deficiency Disorders (IDD) in Tibet. According to the information given by Prof Li Jian Qun, Vice President and Associate Professor of Jiamusi Medical College, Jiamusi, Heilongjiang province, so far 7 of 71 counties have been surveyed for IDD. The prevalence of visible goitre (Grade II and above - WHO classification) in these counties varies between 7% and 30% and the prevalence of endemic cretinism varies between 2% and 3%. Seventy doctors have been trained for IDD survey at the Jiamusi Medical College and already sent to 70 different counties of Tibet for

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conducting detailed epidemiological studies of IDD in Tibet. As a result of their effort, comprehensive information on IDD in Tibet is expected to be gathered in the next two to three years. In the meanwhile, Jiamusi Medical College has established a satellite laboratory at Zhanang, for iodine stimation in water and urine samples collected from Tibet. The Central Leading Group on Endemic Diseases of Tibet has the objective of controlling IDD in Tibet by 1990.

4. CONTROL OF IODINE DEFICIENCY DISORDERS IN CHINA: CURRENT STATUS

4.1 ORGANIZATIONAL FRAMEWORK FOR IDD CONTROL

Though endemic goitre was among the several endemic diseases earmarked for eradication soon after the liberation of the People's Republic of China (PRC) in 1949, effective implementation of iodine prophylaxis in several parts of China began only after 1978 when "Jixian Declaration" was made by General Li Desheng. The Central Leading Group (CLG) on Endemic Diseases, of which General Li Desheng is the Chairman, has, since then played a pivotal role in the control of IDD in PRC. According to Dr Ma Tai, Vice Chairman of the Scientific Advisory Committee on IDD to the CLG, more than 90% of the estimated 300 million people living in iodine deficient regions of China, have been already covered by iodine prophylactic programmes by 1985. This remarkable success accomplished during the course of last seven years, is essentially attributable to the commitment of the CLG in IDD prevention and the dynamism imparted to it by its Chairman, General Li Desheng. In our perception, the organizational framework of the CLG has been critical to its success, and therefore we shall dwell in some detail in describing the same. General Li Desheng, the Chairman of the CLG on Endemic Diseases is a member of the Politburo of the People's Republic of China. In this context it is noteworthy that Politburo is the most

politically powerful body in China. Besides the Chairman, the CLG on endemic diseases has two Vice-chairmen and a total of 40 members. The members include almost all the important administerial and political figures directly involved with the control of endemic diseases in the country. The organizational structure of the CLG and its membership is given in Figure 1. (Appendix VII).

The Central Leading Group meets once in every two years. This meeting is attended by the Director of the office of the Central Leading Group on Endemic Diseases and the Chairman of the Scientific Committees of the various endemic diseases.

In each meeting, Vice-Governor of the respective provinces submit their bi-annual report on the status of endemic diseases control in the province and present their future plan of action. After the presentation, the approved plan of action on the respective endemic disease is summarized and sent out as the document from the Central Political Bureau to the respective provinces for action.

The Chairman of CLG on Endemic Diseases, in his capacity as a member of the Politburo, can be directly in touch with the administrative and political heads of individual provinces and Autonomous Regions, in pursuance of the decisions of the Central Leading Group.

The office of CLG on Endemic Diseases in Shenyang, is under the administrative control of the Director of the CLG who reports directly to the Chairman and in turn operates through several preventive sections under his supervision. Each preventive section is responsible for three endemic diseases (Figure -2, Appendix VIII). The duties of the preventive section include collection of updated information on the study of endemic diseases and its control in different provinces and Autonomous Regions of the country. In addition, it has the pivotal responsibility of coordinating inter-

sectoral activities. In fulfilling these duties and responsibilities, members of the office of the CLG as well as its Director spend at least six months in a year, gathering first hand information and directing programmes personally in the various control programmes.

The office of the Director is also in close contact with the various Scientific Advisory Committees on Endemic Diseases coming under the perview of CLG. Each endemic disease has a special scientific advisory committee. These committees meet together, twice a year, to take stock of the situation as well as update the information. The CLG on Endemic Diseases has a similar organizational set up in each of the provinces and Autonomous Regions. The Directors of different CLG's belonging to the different provinces and autonomous regions report directly to the Director of the CLG headquarters at Shenyang. The Director of CLG after appropriate consultations with the Scientific Advisory Committee on Endemic Diseases, report to the Chairman of CLG. The executive decisions taken in consultations with the Chairman is sent out as a directive from the Politburo.

The CLG on Endemic Diseases is a remarkable example in which political and bureaucratic elements belonging to different levels of organization, are welded together under the leadership of a powerful political personality, to achieve a desired social goal, namely the control of endemic diseases. This powerful organization, however, is found to be extremely responsive to the discerning recommendations of its Scientific Advisory Group. In China, policies framed to achieve specific social goals are pursued with tenacity and purpose. The strong organization like CLG are an important means for achieving the goals. The effective use of state power, under the guidance of a Scientific Advisory Group, by the CLG, over the

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course of last two decades, has systematically eliminated all the major preventable endemic diseases in the country. The last of these is Iodine Deficiency Disorders. If one has to judge based on the past performance, it will be fair to conclude that the People's Republic of China will be free of Iodine Deficiency Disorders by the year 1990.

4.2 IODINE PROPHYLAXIS IN CHINA

Prevention of endemic goitre among Chinese peasants, by iodised salt prophylaxis, was an important objective laid down by Mao Zedong soon after liberation of the People's Republic of China. In point of fact, we saw a slogan to this effect by Mao Zedong inscribed on the wall of salt iodation plant at Huachaun town. However, the major and countrywide movement to prevent Iodine Deficiency Disorders by iodine prophylaxis came into being primarily after the "Jixian Declaration" made in 1978 by General Li Desheng.

During the span of seven years, between the 1978 "Jixian Declaration" and out visit in 1985, about 90% of the 300 million people living in iodine deficient regions of China has been covered by an effective salt iodation programme. Prophylaxis of endemic goitre in some provinces of China is given in Table III. In most of the iodine deficient regions of China, the salt consumed is sea-salt which reach the interior of the country from marine salt bins through water transport and by rail. Because of the state controlled trading activities, salt iodation of iodine deficient regions has been eminently successful even without legal enforcement. The Chinese Government has developed a fairly decentralized system of salt iodation by establishing 50 tons per day capacity iodation plants in all the Government warehouses of counties with significant prevalence of IDD. There are an estimated total of 1320 salt iodation plants distributed in the different endemias of the country, of which 792 are mechanically operated plants and the remaining 528 are manually operated.

Salt iodation is accomplished by spraying potassium iodide (KI) solution on crystalline or coarse salt. The level of iodisation aimed in Northern province where the salt consumption per caput per year is estimated 9.5 kg is 20 parts per million (PPM). The high salt intake in North China is due to the habit of consuming preserved pickled vegetables during most of the months of the year. In contrast, in Southern China, where fresh vegetables are available round the year, the estimated salt consumption per caput per year is 4.5 kg. Therefore, in Southern provinces, the level of salt iodation aimed is 33 PPM.

China depend on Japan for its supply of iodine. The cost of 1 ton of iodine is 40,000 yuans. Considering the fact that iodine is a finite terrestrial resource and its increasing price with its increasing demand, there is a clear possibility of escalating cost for salt iodisation programme in future. This, coupled with emerging trend of economic liberalization and privatization of trade, iodised salt prophylaxis in China stand the distinct risk of breakdown in continuity. In planning of future strategy for IDD control, this is an important consideration to be kept in mind.

Due to partial decentralization of the salt iodization programme, the problem of loss of iodine in transit is largely non-existent in China. However, during the course of our visit to the salt iodation plant, we noticed with satisfaction the fact that bags used for packing the iodised salt were indeed plastic-lined. Also we had an occasion to note that in the retail governmental outlets, salt is repacked into 2.5 kgs or 1 kg units for sale. These measures largely ensure the safe arrival of iodine to the consumer even when the level of iodation at source permit no extra level of iodisation for loss in transit. That the iodine is reaching through the medium of salt at the consumer level was also evident to us during our visit to Jixian village where we found the entire children of school-going age free of goitre.

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4.2.1 OTHER METHODS OF IODINE PROPHYLAXIS

Though the majority of the Chinese people consume sea-salt, the notable exception to this rule are seen primarily in three administrative regions namely Inner Mongolia, Xinjiang and Tibet. These regions have several natural salt lakes and salt deposits. Therefore, it is possible to simply dig salt from these and use for consumption. In the absence of properly organized collection, transportation and distribution, salt iodation is a difficult task, to achieve in these provinces. This has added considerable problem of logistics in the implementation of salt iodization programme in these three provinces where there is a major problem of IDD.

Among the alternative modes of iodine prophylaxis that are being adopted in PRC, the major one is through Iodised Oil. A total of 5 million people predominantly in Inner Mongolia and Xinjiang, so far have been given this mode of prophylaxis either through parenteral or oral routes. Iodised oil prophylaxis can be an effective mode in China to those areas where there is considerable problem of logistics to implement salt iodisation programme. This is so because of the unique success achieved by Chinese scientist in developing techniques to manufacture iodised oil using soyabean oil as the base. At present, there are three places in China where iodised oil is produced. The factory in Shanghai Municipality and Wuhan, the Capital City of Hubei province produces oral and injectable oil preparations while the factory at Anyang in Henan province produces only oral capsules of iodized oil.

In view of the technology developed in China to indigenously manufacture iodised oil, it can be an important source of supply of iodised oil for IDD programmes in developing countries.

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III. FUTURE STRATEGY TO CONTROL IDD IN CHINA

1. FUTURE STRATEGY

1.1 Though the projections of the Central Leading Group on Endemic Diseases, estimate 300 million people to be living in known iodine deficient regions, during the course of our detailed discussions with the members of CLG as well as scientists of IDD group at the two medical colleges, it became evident that a systematic and comprehensive study on a sampling basis, encompassing the entire country is yet to be done to generate an accurate IDD map of China, such a map alone can form a useful data base for mounting country-wide campaigns to eradicate IDD by iodine prophylaxis. We understand, as we have already indicated in Section II. 1, that such efforts are very much on the agenda of the CLG and that a comprehensive map of IDD in China will be a reality in the near future.

1.2 Even as the effort to produce a comprehensive IDD Map of China is progressing, the achievements in terms of prophylaxis adopted in populations already detected to be iodine deficient, is indeed impressive. The examples in this regard (as we have already cited in the previous sections) are indeed inspiring and demonstrate that iodine prophylaxis is an achievable objective in developing countries given the political will and administrative diligence and dynamism. Needless to say, the unique socio-political system of China has greatly contributed to the success of its IDD programmes. However, there is no reason to believe that the success story of IDD control in China can not be repeated in the other developing countries with different socio-political systems. Indeed there is much that other developing countries can learn from the Chinese experience.

1.3 While giving kudos to the Chinese programme, it is not our intention to gloat over certain facts which are blemishes in an otherwise blemishless control programme. The most striking among there is the fact that three Autonomous Regions of PRC, viz., Inner Mongolia, Xinjiang and Tibet are still not covered by effective iodation programmes, even though every indications point to the prevalence of serious IDD there. This is particularly true with regard to the Tibet Autonomous Region. Priority efforts should be made to prevent IDD in these regions. In this context, we are glad to note that CLG aims to eradicate IDD in these regions by the year 1990.

1.4 Based on the above considerations, future strategy of IDD control in China should have the following elements.

(a) Generatin of a comprehensive IDD map of China based on epidemiological studies done as per internationally accepted criterion. Such a map should provide data on the extent and severity of IDD problem in the whole country, using basically three parameters:

(i) Prevalence of goitre and cretinism
(ii) Pattern of urinary iodide excretion
(iii)Incidence of neonatal hypothyroidism.

(b) Consolidation of iodine prophylaxis, in areas where it is already accomplished, by organizing a network of monitoring and evaluation, which has the inherent competence for early detection and prompt correction of breakdown in on-going iodine prophylactic programmes.

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(c) Urgent control measures in the three autonomous regions, where IDD is known to exist with great severity and where effective prophylactic programmes are yet to be implemented. Top priority should be given in overcoming the existing logistical problems in these regions, so as to achieve the proclaimed goal of IDD control there by the year 1990.

1.5 Considering the vastness of the country and the geo-climatic variations that exist in China, and also considering the staggering demographic dimensions of the country; to accomplish the above objectives would be an enormous task. However, there are two important reasons why the above objectives should be and can be aimed with determination and optimism. The first of these relate to the heroic and successful effort by the People's Republic of China to control its population by successfully adopting the stringent one child policy. This policy brings with it the normal responsibility that every child that is born should be given full opportunity for development and fulfillment. In this context, prevention of IDD by continually successful iodine prophylaxis, is seen as an important measure to promote child development in China. It is this perception that forms the moving force behind the Chinese IDD programme.

The reason for optimism, relate to the powerful organizational framework of the Central Leading Group on Endemic Diseases, its dynamic leadership and its impressive record of accomplishments.

The powerful motivation that springs from a desire to ensure the health of the limited number of children that are being permitted to be born in China, as well as the availability of

a powerful organization like CLG to make that desire a reality, are the two important elements that are likely to ensure success of the three-fold future strategy of IDD control in China.

2. PLAN OF ACTION

The three-fold strategy that we envisage for the whole country would necessarily take both time and enormous resources to implement. However, we see the following as an important first step towards achieving the elements of the strategy.

As we have already indicated that important elements in a modern IDD control programme are:

(a) Epidemiologic studies to assess the prevalence of goitre and cretinism using internationally accepted criteria.

(b) Determining the state of iodine nutritue of the population in question by the urinary iodide excretion pattern.

(c) Pre-determining the risk of mental retardation in the emerging generation of the population in question, by assessing the incidence of neonatal hypothyroidism.

While a good measure of expertise is available in the two medical colleges concerned with IDD in China (See Appendix IX for details of institutions covered with IDD programmes in China), there is a need to reinforce activities in these centres to impart modern percepts and techniques. In this context, the proposal made by the Ministry of Public Health, PRC, to develop three centres of excellence for the study and surveillance of IDD in China is a sound one.

(a) They would meet the training needs to develop personnel of the required expertise for the programme.

(b) They would adopt and adapt new technology in the study and surveillance of IDD in China and help promote its countrywide application.

(c) They would serve as National Reference Centres for Quality Control of the various laboratory methodologies in use in IDD programmes.

(d) They would serve as an important international link of the ongoing IDD programmes in China and elsewhere in the world.

Considering above laudable objectives of the three centres proposed to be developed, the modest inputs requested for their development (please refer Chinese proposal) can be said to be largely cost-effective. Appendix X gives our estimate of the cost involved in developing the three centres. UNICEF being primarily interested in supporting "catalytic programmes" that would ultimately lead to better child health and development. The present proposal seeking UNICEF support for the development of three centres for the study and surveillance of IDD in China would be eminently within the proclaimed objectives of UNICEF.

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TABLE - I

Iodine Deficiency Disorders in Some Provinces of China (Statistics at the end of 1983)

S.No.	Name of Provinces	Endemic Counties	Endemia Xiangs (Towns)	Endemia No. of Endemic Pop (000)	No. of Goiterous Patients (000)	No. of Treated Goiterous (000)	No. of Cretins	No. of Pop.having Iodized salt in endemias (000)	No. of Pop. having iodized oil & iodized H_2O in endemias(000)	No. of IDD Basically controlled	No. of Xiangs IDD basically controlled
1.	Tianjin	2	75	1,190	62	1.6	113	1,190	I.A.	2	75
2.	Beijing	12	180	2,500	700	80.0	2,660	3,800	I.A.	6	160
3.	Hebei	70		17,343	1920	81.0	9,291	18,739	231	70	1,617
4.	Shanxi	87	751	5,758	680	117.0	1,813	6,000	97	69	702
5.	Nei-monggol	69	820	10,046	5000	249.0	6,205	10,152	1,402	I.A.	256
6.	Jiangsu	13	491	I.A.	730	2.7	I.A.	2,000	I.A.	I.A.	I.A.
7.	Heilongjiang	78	1,710	22,950	2880	97.0	3,620	22,950	140	78	1,682
8.	Liaoning	53	867	16,428	2750	218.0	8,532	16,260	599	53	861
9.	Jilin	45	770	16,312	4770	346.0	3,513	16,310	73	45	770
10.	Xinjiang	73	637	9,333	9550	170.0	5,923	3,114	2,593	I.A.	37
	Total:	502	6,301	101,860	29042	1,332.3	41,670	100,510	5,135	323	6,160

Source: Central Leading Group on Endemic Diseases, July 1985.

I.A. = Information awaited.

TABLE - II

Iodine Deficiency Disorders in Yangzhong county of Jiangsu Province

Name of Towns	Villages	Total Pop.	Population examined	Goitre prevalence rate (%)	Urinary Iodine (ug/g creatine)			Water Iodine
					25	25-50	50	
	] Changchnen	935	725	28.07	1	6	2	13.3
	] Schecheng	1,858	729	14.99	1	5	1	14.3
Shangjao	] Juengfien	1,144	1,041	18.90	3	6	0	31.3
	] Pushou	1,336	655	37.56	2	1	3	30.5
	] Heinping	1,872	615	16.36	0	2	8	36.6
	] Jouhao	1,483	591	36.38	1	5	3	25.9
	] Ducheing	837	618	28.86	2	8		28.3
Shangmao	] Dazueng	993	699	37.91	0	5	5	31.0
	] Zhenan	2,030	703	37.69	1	1	5	17.0
	] Tuenxien	1,082	619	10.34	3	5		25.6
	] Beishen	1,359	637	12.86	5	3	2	1.3
	] Ziensheng	850	633	39.65	1	6	3	1.8
Xienful	] Nanwan	1,164	831	30.69	1	7	1	1.8
	] Dienhua	1,301	698	30.52	2	3	5	17.2
	] Duenjien	1,076	667	31/63	3	5	2	1.8
	] Daduen	1,026	601	35.60	0	1	6	20.7
	] Xienhua	899	698	36.10	0	3	7	14.1
Joupang	] Changsha	1,005	611	39.09	5	1	3	11.9
	] Jangtai	811	732	39.75	1	2	7	20.3
	] Tuende	980	718	10.21	0	1	6	25.1
	] Xienxien	1,312	713	29.07	0	1	1	57
	] Xienchuen	1,133	621	10.10	0	1	5	16.6
Xienba	] Zhiliang	1,010	602	15.68	1	5	1	73
	] Xienjiang	833	681	10.35	0	2	8	23
	] Fanglergiao	1,271	716	29.17	0	3	7	28
Total:	-	29,675	17,313	37.29	33	107	99	25.7

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47/1, (First Floor, St. Marks Road,
Bangalore - 560 001.

TABLE - III

Prophylaxis of Endemic Goitre in Some Provinces of China

Province or	City or County	Commune of village	Goitre rate before prophylaxis %	Year	Years of Iodized salt prophylaxis %	Goitre rate afterprophylaxis %	Year
Hebi	Changde		25.1	1961	14	8.3	1975
Tianjin	Jixian		10.0*				
			60.0+	1930		5.8	1981
Hubei	Nazhang	Limiao	62.1	1964	12	10.9	1976
Ningxia	Jingyuan		56.3	1964	16	9.0	1980
Anhui	Hueshan	Wuchihe	44.7		22	2.9	
	Yuexi	Baimao	42.0		15	2.4	
Guizhou	Majiang	Heba	31.5	1979	2	5.2	1981
Yunnan	Kunming		20.0	1910		9.8	177

*Male

+Female

APPENDIX – I
CHINESE CLASSIFICATION FOR GRADING OF GOITRE

Normal Thyroid:	Thyroid gland is not palpable.
Physiological Goitre:	If the enlargement of the thyroid gland is less than the distal phalanx of the subject's thumb, then it is classified as physiological goitre.
Grade I:	Thyroid enlargement is more than the distal phalanx of the subject's thumb but less than 1/3rd size of the subject's fist.
Grade II:	Thyroid enlargement is more than 2/3rd size of the subject's fist.
Grade III:	Thyroid enlargement is equal to the size of the subject's fist.
Grade IV:	Huge goitre. Thyroid enlargement bigger than the size of the subject's fist.

APPENDIX – II

INTERNATIONAL CLASSIFICATION FOR GRADING OF GOITRE

1. Definition of Goitre Stages

A. Definition of Goitre

A normal thyroid gland should have the minimal size compatible with euthryoidism under conditions of normal iodine intake (100–150 ug/day). This gland would be non-palpable or barely palpable.

For practical purpose, the following definition of goitre of Perez et al is recommended: "A thyroid gland whose bilateral lobes have a volume greater than the terminal phalanges of the thumbs of the person examined will be considered goitrous."

B. Estimation of thyroid size

We recommend a slight modification of the system of Perez et al:

Stage 0: No goitre

Stage Ia: Goitre detectable only by palpation and not visible even when the neck is fully extended.

Stage Ib: Goitre palpable and visible only when the neck is fully extended. This stage also includes nodular glands, even if not goitrous – see Section C below.

Stage II: Goitre visible with the neck in normal position; palpation is not needed for diagnosis.

Stage III: Very large goitre which can be recognized even from a considerable distance.

In case of doubt between any two of these stages, the lower should be recorded.

/...

Measurement of thyroid surfaces by adopting the procedure of MacKennon and Gaitan is particularly recommended for standardization of technique among different examiners anda for comparison of surveys in different areas and at different times.

The total goitre rate is the prevalence of Stages I + II + III; the visible goitre rate is the prevalence of Stages II + III.

This classification is appropriate to field surveys for public health purposes. For clinical purposes, more precise information can be obtained by other techniques including scinitigraphy and sonography.

C. Estimation of the consistency of the thyroid by palpation

The diffuse or nodular consistency of the thyroid should be recorded, for nodules usually occur in areas with prolonged marked iodine deficiency. This estimation should be independent of that for the size of the thyroid, with the following exception: When one or more nodules are found in non-goitrous gland, it will be recorded as Stage 1b since nodularity implies marked modifications in the structure of the gland.

2. Definition of Endemic Goitre

An area is defined as endemic with respect to goitre if more than 10 per cent of its child population (6-12 years) is found to be goitrous. This figure of 10 per cent is chosen because higher prevalence usually points to an environmental factor while a prevalence of several per cent is common even when all known environmental factors are controlled.

APPENDIX - III

CHINESE DEFINITION OF ENDEMIC CRETINISM

1. The defective subjects must be living in iodine deficient region (They must be born and brought up in that region).

2. The subjects have neurological defects including mental retardation, deaf-mutism, cretinism facies, spastic gait or difficulty in walking.

3. Presence of clinical hypothyroidism.

To diagnose a cretin:

(a) Criteria 1 and/or criteria 2/3 has to be fulfilled.

(b) Other causes of mental retardation, deaf-mutism and hypothyroidism have to be extended.

APPENDIX – IV

INTERNATIONAL DEFINITION OF ENDEMIC CRETINISM

A. The condition of endemic cretinism is defined by three major features:

(1) Epidemiology. It is associated with endemic goitre and severe iodine deficiency.

(2) Clinical manifestations. These comprise of mental deficiency together with either:

(a) A predominant neurological syndrome including defects of hearing and speech, squint and with characteristic disorders of stance and gait of varying degree, or

(b) Predominant hypothyroidism and stunted growth.

Although in some regions either type may predominate, in other areas a mixture of the two syndromes may occur.

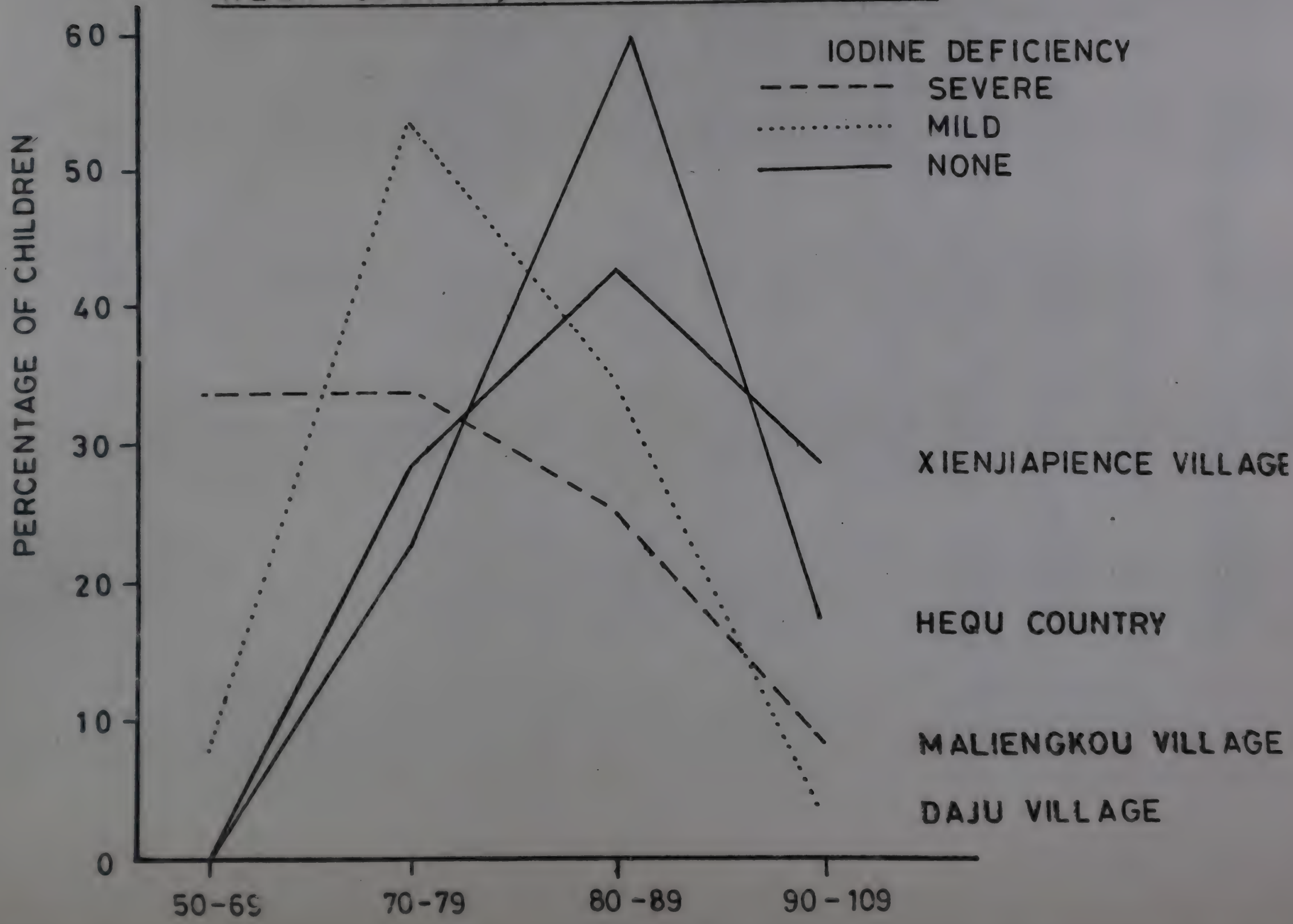
(3) Prevention. In areas where adequate correction of iodine deficiency has been achieved, endemic cretinism has been prevented.

B. Other Development Abnormalities

It has now become increasingly clear that endemic cretinism represents only the extreme stage of a broader spectrum of developmental abnormalities including decreased intellectual potential. These abnormalities are also prevented by correction of iodine deficiency.

APPENDIX V

I.Q. DISTRIBUTION OF CHILDREN (7 TO 8 YRS) IN HEQN COUNTRY, SHANXI PROVINCE, CHINA



APPENDIX VI

RESULTS OF D.D.S.T. OF CHILDREN 0—5 YRS IN THREE AREAS OF CHINA

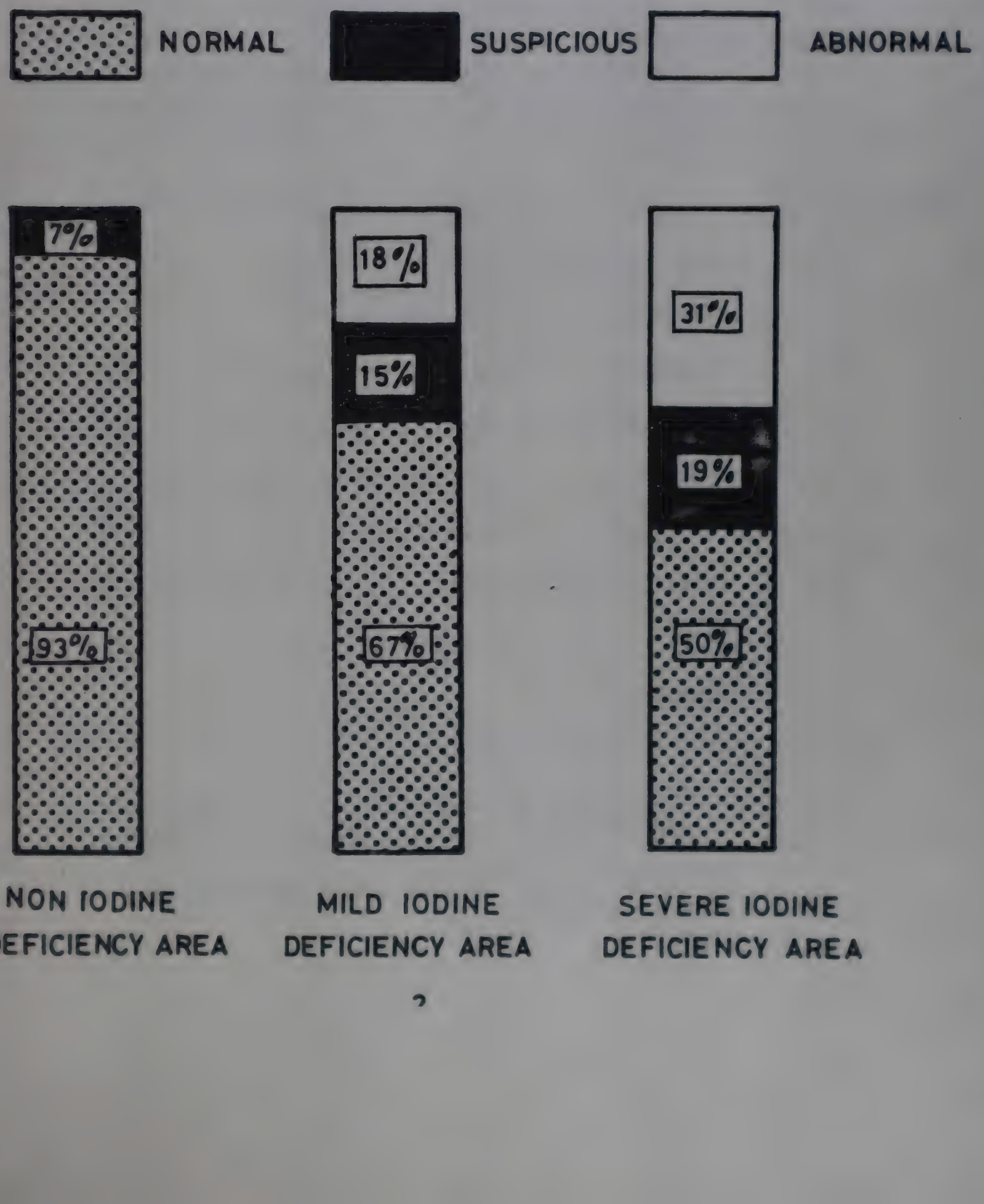


FIGURE - 1

ORGANIZATIONAL STRUCTURE OF CENTRAL LEADING GROUP ON ENDEMIC DISEASES IN CHINA

Headquarters at: SHENYANG, LIAONING PROVINCE

CENTRAL LEADING GROUP

Chairman: General Li Desheng
Member, Standing Committee of Politburo
People's Republic of China.

Vice-Chairman:

1. Dr Kue Tze Heng
(Orthopaedic Surgeon)
Vice Minister of
Public Health
Beijing, PRC

2. Dr. Sue Wei Ben
Secretary of Communist Party
of Liaoning Province
Shenyang, PRC

Members:

1 Vice-Minister of Light Industry

2 Vice-Minister of Finance

3 Vice-Minister of Commerce

4 Vice-Minister of Agriculture, Forestry & Fishing

5 Vice-Minister of Food Supply Corporation

6 Vice-Minister of Central Pharmaceutical Administration

7 Vice-Minister of Chemical Industry

8 Chief of the National Co-operative Head Office

9 Bureau of Material Supply

10 Xinhua News Agency

11 Central Broadcasting Agency

12 Vice-Governors of 28 Provinces, Municipalities (Except Shanghai & Taiwan) & Autonomous Regions

13 Director of Office of Central Leading Group on Endemic Diseases

APPENDIX -VIII

FIGURES - 2

OFFICE OF THE CENTRAL LEADING GROUP ENDEMIC DISEASES

Chairman

Vice-Chairman

Members

OFFICE OF THE CENTRAL LEADING GROUP ON ENDEMIC DISEASES SHENYANG, LIAONING PROVINCE	SCIENTIFIC COMMITTEE ON ENDEMIC DISEASES

Director: Dr Sun Xi
Director of the Office of the Central Leading Group on Endemic Diseases, Shenyang, Liaoning Province.

Members: 21

Sections Four

First Preventive Section	Second Preventive Section	Scientific Research Station	Secretariat
Dr Sun Jian Chun	Dr Shen Er Li		
(1) Brucellois	(4) I.D.D.	(i) Propoganda	
(2) Kashelack	(5) Filariasis	(ii) Education	
(3) Plague	(6) Keshang Disease	(iii) International Relations	

APPENDIX - IX

LIST OF MEDICAL COLLEGES AND ENDEMIAS OF THEIR RESPONSIBILITY

I. :Responsibility for North China

:Total inhabitants of IDD Endemia: 37.1430 million

1. Tianjin Municipality
2. Beijing Municipality
3. Hebei Province
4. Shanxi Province
5. Jiangsu Province (Yangzong County)
6. Inner Mongolia Autonomous Region.

II. JIAMUSI MEDICAL COLLEGE, JIAMUSI, HEILONGJIANG PROVINCE

:Responsibility for North East China &
Tibet Autonomous Region

:Total inhabitants of IDD Endemia: 54.4493 million

1. Heilongjiang Province
2. Jilin Province
3. Liaoning Province
4. Tibet Autonomous Region: Lhasa City and Rikezhe Area (Minority Nationality)

III. INSTITUTE OF PREVENTION & TREATMENT OF ENDEMIC DISEASES

URUMQUI, XINJIANG AUTONOMOUS REGION

:Responsibility for North West China

:Total inhabitants of IDD endemia: 37.2717 million

1. Xinjiang Autonomous Region.
2. Hetian Luopu County (Minority Nationality).

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IV. GUIYANG MEDICAL COLLEGE, GUIZHOU PROVINCE

1. Guizhou Province
2. Sichuan Province
3. Yunnan Province

V. ANNUEI MEDICAL COLLEGE, HEFEI, ANHUEI PROVINCE

1. Anhuei Province
2. Jiangsu Province
3. Shandong Province
4. Jiangxi Province
5. Fujian Province
6. Zhejiang Province

VI. HENAN MEDICAL COLLEGE, ZHEN YSHEU HENAN PROVINCE

1. Henan Province
2. Hubei Province
3. Hunan Province
4. Guangdong Province
5. Guangxi Province.

APPENDIX - X

LIST OF PERSONS MET

HEILONGJIANG PROVINCE

HARBIN

1. Madam Suen Zao Quien
   Minister of Health, Harbin
   Heilongjiang Province

2. Dr. Yu Hai Yuan
   Director of Leading Group of
   Endemic Diseases in Heilongjiang
   Province
   Harbin, Heilongjiang Province.

JIAMUSI

3. Prof. Li Jian Qun
   Vice President & Associate Professor
   of Jiamusi Medical College
   South Section, Dexiang Street,
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